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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/643,580	08/18/2003	Andrew B. Hastings	1376.721US1	3953

21186 7590 01/09/2006	EXAMINER
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ART UNIT	PAPER NUMBER
2186	

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Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)
Office Action Summary	10/643,580	HASTINGS, ANDREW B.
	Examiner	Art Unit	
	Shane M. Thomas	2186	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 August 2003*.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-27* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,6,9-11,15,18-20,24 and 27* is/are rejected.

7)☒ Claim(s) *3-5,7,8,12-14,16,17,21-23,25 and 26* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *13 July 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

        1.☐ Certified copies of the priority documents have been received.

        2.☐ Certified copies of the priority documents have been received in Application No. _____.

        3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION

This Office action is responsive to the application filed 8/18/2003. Claims 1-27 are

presented for examination and are currently pending.

Excerpts from all prior art references cited in this Office action shall use the shorthand

notation of (column # / lines A-B) to denote the location of a specific citation. For example, a

citation present on column 2, lines 1-6, of a reference shall be herein denoted as "(2/1-6)."

The examiner requests, in response to this Office action, any reference(s) known to

qualify as prior art under 35 U.S.C. sections 102 or 103 with respect to the invention as defined

by the independent and dependent claims. That is, any prior art (including any products for sale)

similar to the claimed invention that could reasonably be used in a 102 or 103 rejection. This

request does not require applicant to perform a search. This request is not intended to interfere

with or go beyond that required under 37 C.F.R. 1.56 or 1.105.

The request may be fulfilled by asking the attorney(s) of record handling prosecution and

the inventor(s)/assignee for references qualifying as prior art. A simple statement that the query

has been made and no prior art found is sufficient to fulfill the request. Otherwise, the fee and

certification requirements of 37 CFR section 1.97 are waived for those documents submitted in

reply to this request. This waiver extends only to those documents within the scope of this

request that are included in the application's first complete communication responding to this

requirement. Any supplemental replies subsequent to the first communication responding to this

request and any information disclosures beyond the scope of this are subject to the fee and

certification requirements of 37 CFR section 1.97.

In the event prior art documentation is submitted, a discussion of relevant passages, figs.

etc. with respect to the claims is requested. The examiner is looking for specific references to

102/103 prior art that identify independent and dependent claim limitations. Since applicant is

most knowledgeable of the present invention and submitted art, his/her discussion of the

reference(s) with respect to the instant claims is essential. **A response to this inquiry is greatly**

appreciated.

The examiner also requests, in response to this Office action, that support be shown for

language added to any original claims on amendment and any new claims. That is, indicate

support for newly added claim language by specifically pointing to page(s) and line no(s). in the

specification and/or drawing figure(s). This will assist the examiner in prosecuting the

application.

Drawings

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every

feature of the invention specified in the claims. Therefore, the method of mapping virtual

memory to physical memory (steps of claims 1-9) must be shown or the feature(s) canceled from

the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to

the Office action to avoid abandonment of the application. Any amended replacement drawing

sheet should include all of the figures appearing on the immediate prior version of the sheet,

even if only one figure is being amended. The figure or figure number of an amended drawing

should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure

must be removed from the replacement sheet, and where necessary, the remaining figures must

be renumbered and appropriate changes made to the brief description of the several views of the

drawings for consistency. Additional replacement sheets may be necessary to show the

renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an

application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet"

pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will

be notified and informed of any required corrective action in the next Office action. The

objection to the drawings will not be held in abeyance.

Specification

The disclosure is objected to because of the following informalities:

Page 7 of the specification, contains a typographical error - "with a" on line 11.

The specification has not been checked to the extent necessary to determine the presence

of all possible minor errors. Applicant's cooperation is requested in correcting any errors of

which applicant may become aware in the specification.

Claim Objections

Claims 1-27 are objected to because of the following informalities:

As per claims 1,10, and 19, the term --contiguous memory-- of the last line should be

amended to --contiguous *physical* memory-- to further clarify the claimed limitations.

As per claim 2, 11 and 20, the claims contain a typographical error - the term "ov" should

be corrected to "of."

As per claims 7,16, and 25, the term --the two or more virtual memory pages-- should be

amended to --the two or more contiguous virtual memory pages-- to further clarify the claimed

limitations.

Claims 3-6,8,9,12-15,17,18,21-24, 26, and 27are objected to as being dependent on

objected claims.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the
subject matter which the applicant regards as his invention.

Claims 2,6,11,15,20, and 24, are rejected under 35 U.S.C. 112, second paragraph, as

being indefinite for failing to particularly point out and distinctly claim the subject matter which

applicant regards as the invention.

As per claims 2, 11, and 20, it is not clear whether (a) the size of the two or more

contiguous pages of virtual memory are different values *as well as* the alignment of the two or

more contiguous pages of virtual memory having different values or (b) if the size value of the

pages are different from the alignment values of the pages as the claims are open to multiple

interpretations. Nonetheless, for the purposes of expedited examination, the Examiner shall

interpret the claimed limitation in light of the latter interpretation, such that the size value of the

contiguous pages is a different value than the alignment value.

As per claims 6,15, and 24, it is not clear whether the term --the population count

instruction-- refers to an undefined population count instruction or if the instruction refers to the

--leading bit count-- instruction as the term --*the* population count-- instruction lacks antecedent

basis. Nonetheless, for the purpose of examination, the Examiner shall interpret --the population

count instruction-- as --the leading bit count instruction--.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1,2,9-11,18-20, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable

over McLellan et al. (U.S. Patent No. 5,568,415) in view of Priem et al. (U.S. Patent No.

6,446,186).

As per claims 1,10, and 19, McLellan teaches identifying two or more contiguous pages

in virtual memory to be mapped to physical memory (7/42-65); determining the size in pages

(1,8,64, or 512 8K granularities) of the two or more contiguous pages of virtual memory (7/66 -

8/2); determining an alignment (either 1,8,64, or 512, 8K-aligned pages) in pages of the two or

more contiguous pages of virtual memory (7/42-50); and mapping the two or more pages in

virtual memory to contiguous memory via a single mapping in the translation buffer (7/42-45).

McLellan does not specifically teach searching a free bit structure to locate a free section

of contiguous physical memory having the desired size and alignment (i.e. a free granularity size

of 1,8,64, or 512 8K-pages). It would have been obvious to one of ordinary skill that the system

of McLellan would have had a method in which to distinguish available memory pages from

pages that are currently in use. Priem teaches a system for mapping contiguous pages of virtual

memory to contiguous pages of physical memory (figure 5) that uses a method of encoding

certain bits (headers) of the translation table entries (PTEs) to distinguish which physical pages

have already been allocated to virtual memory pages (3/66 - 4/49). The Examiner is considering

the collection of each of the translation table entries' header bits to be a --free bit data structure--,

as they indicate valid ranges of virtual pages that are currently mapped to physical pages (4/31-

40). Utilizing such a concept would have given the system and method of McLellan a quick

process that discerns a free data page from one that is currently mapped. Therefore, it would

have been obvious to one having ordinary skill in the art at the time the invention was made to

have combined the virtual to physical page mapping system of McLellan with the free bit data

structure teaching of Priem in order to have quickly (by reading only two bites per table entry)

determined whether or not a given range of physical memory pages are free and available to have

virtual pages mapped to them.

Once a page granularity having the requested amount of free pages (and thus alignment)

has been found (i.e. one of 1,8,64, and 512 8K-pages), it would have been seen that the

contiguous virtual memory pages of modified McLellan would have been mapped to the found

free section of contiguous physical pages via the single mapping discussed in (7/42-45) of

McLellan. McLellan teaches mapping to contiguous physical memory pages in (13/64-67).

As per claims 2,11, and 20, modified McLellan shows that the size of the two or more

contiguous pages (i.e. 8 kilo-bytes per page) and the alignment of the pages (i.e. one of 1,8,64, or

512 times 8 kilo-bytes) are different values (i.e. 8K compared to 8*8K, 64*8K, or 512*8K).

Refer to (7/66 - 8/2).

As per claims 9,18, and 27, Priem teaches extracting free bits (header bits 404 - figure 4)

from a page status table (i.e. translation table 400).

Allowable Subject Matter

Claims 3-5,7,8,12-14,16,17,21-23,25, and 26 are objected to as being dependent upon a

rejected base claim, but would be allowable if rewritten in independent form including all of the

limitations of the base claim and any intervening claims.

Claims 6,15, and 24, would be allowable if rewritten to overcome the rejection(s) under

35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations

of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

As per claims 3,5,12,14,21 and 23, the prior art of record does not specifically teach nor

suggest, alone or in combination, the step of processing a word of free bits using either a

population count instruction or a leading bit count instruction to determine the number of free

bits in the word. The combination of McLellan and Priem teaches analyzing the free bits 404 in

(4/10-40) of Priem.

As per claims 7,16, and 25, the prior are of record does not specifically teach nor suggest,

alone or in combination, searching a consecutive number of free bits, where the number of

consecutive free bits equals the number of contiguous virtual pages to be mapped.

As per claims 8,17, and 26, the prior are of record does not specifically teach nor suggest,

alone or in combination, counting a consecutive number of free bits where the number of free

bits found is started from bits representing a page number that is an integer multiple of the

determined alignment [of the two or more contiguous virtual pages].

Claims 4,13, and 22, are objected as being dependent on objected base claims.

Claims 6,15, and 24, are objected as being dependent on objected base claims.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's

disclosure.

Nijhawan et al. (U.S. Patent No. 6,374,341) teaches the inherency of determining an

alignment when variable page-widths are used in a translation buffer (10/17-59).

Barrus et al. (U.S. Patent No. 6,981,120) teaches a method of mapping contiguous virtual

memory pages to physical memory pages (figure 2).

Ludwig (U.S. Patent No. 5,450,558) teaches mapping contiguous virtual pages to a range

of contiguous physical memory pages using a single TLB entry (4/21 - 5/4).

Strongin et al. (U.S. Patent No. 6,560,688) teaches mapping contiguous virtual pages to contiguous physical pages using masking bits (13/61 - 14/7).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shane M Thomas whose telephone number is (571) 272-4188. The examiner can normally be reached M-F 8:30 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matt M Kim can be reached at (571) 272-4182. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Shane M. Thomas

HONG CHONG KIM
PRIMARY EXAMINER